ALBERTA HERITAGE FOUNDATION FOR MEDICAL RESEARCH

1985-86 ANNUAL REPORT

OPPORTUNITIES FOR DISCOVERY

"Everything that is really good and inspiring is created by an individual who can labor in freedom."

Albert Einstein

The Alberta Heritage Foundation for Medical Research exists to create opportunities for scientists to discover new knowledge in the search for better health care. The Foundation does so by attracting creative, productive people, placing them in a supportive environment, and assuring them the time and freedom to explore.

Foundation Grants and Awards create opportunities in many ways. Through Alberta universities, scientists are given competitive salaries, a five-year renewable contract, and are guaranteed 75 percent of their time will be free from teaching or administrative duties. Establishment grants support an efficient laboratory and equipment grants provide state-of-the-art technology to give researchers a competitive edge.

Equally important, together the Foundation and Alberta universities have recruited a critical mass of scientists in most major disciplines and many of these people are now gaining international recognition. For example, a cardiac researcher moving to Alberta knows he or she will have colleagues working through the whole spectrum from the electrophysiology of an isolated cardiac cell to the whole patient treated for heart attack. If some area of expertise is lacking, there are programs to bring in visiting experts, to send researchers away for specialized study, and to gather leading scientists at national and international conferences held in Alberta.

In 1985-86 the Foundation added to existing programs such as the diabetes research program and introduced entirely new thrusts such as work on the genetics of cancer. Twenty-three new senior scientists and 174 new fellows and students were funded this year.

The new Technology Transfer Program creates opportunities where none existed before. One of a kind in Canada, the program fills a long-time funding gap—the awkward period where a scientific idea is promising enough to warrant further work towards commercialization, but is not advanced enough to attract investors.

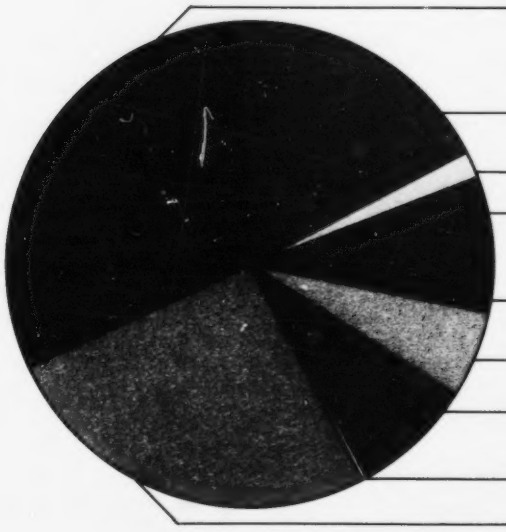
This annual report only looks briefly at some of the 1985-86 additions to the Foundation's programs. Details on the ongoing work by some 700 senior scientists, fellows, and students will be covered in the Second Triennial Report to be published early in 1987 with the first International Review Board Report.

AN OVERVIEW

In November 1979 an Act of Legislature created the Alberta Heritage Foundation for Medical Research to establish and support a balanced, long-term program of medical research based in Alberta. Foundation activities are directed toward the discovery of new knowledge and the application of that new knowledge to improve health care of Albertans and all people.

To build a balanced program, the Foundation supports basic and clinical scientists, both well-established people and young people beginning new research careers. Investigators explore a broad spectrum of disciplines such as: biochemistry, microbiology, pediatrics, immunology, neurology, dentistry, pharmacology and many others.

The Foundation is supported by a $300 million endowment fund which generates interest revenue for operating expenses. The Foundation stands at arm's length from the government under the management of a group of distinguished Trustees.



AHFMR Expenditures 1985/86	Total $45.34 M
Scholarship/Heritage Medical Scientist Awards, Clinical Investigators, Establishment Grants	$ 14.29 M
Fellowship Awards and Research Allowances	$ 8.01 M
Administrative Costs	$ 1.06 M
Major Equipment Grants and Maintenance (excluding Establishment Grants)	$ 3.46 M
Scientific Policy and Evaluation Costs	$ .40 M
General Research Grants *	$ 2.52 M
Studentship Awards and Research Allowances	$ 4.06 M
Technology Transfer Grants	$ .05 M
Research Support Costs and Institutional Grants to Universities **	$ 11.49 M

* Conference Grants, Visiting Scientists, Visiting Lecturers and Faculty Travel, Independent Establishment Grants, Independent Research Allowances, Special Initiative Funding, Visiting Professorships and Clinical Traineeships.

** Includes Institutional Grants for planning and construction of new research buildings.

Awards and Grants

The main activity of the Foundation is an awards and grants program designed to establish a critical mass of career scientists in Alberta. The program includes:

- Heritage Medical Scientist, Heritage Medical Scholarship, and Clinical Investigatorship Awards.
- Studentships (full-time, part-time, and summer)
- Fellowships (full-time, part-time, and clinical)
- Establishment Grants for New Investigators
- Grants for Major Equipment
- Grants for Equipment Maintenance
- Visiting Scientists to Alberta
- Visiting Scientists from Alberta
- Visiting Lecturers
- Visiting Professors
- Travel Grants
- Grants for Conference Support & Workshops
- Technology Transfer Grants
- Clinical Traineeships

Much of the Foundation's work is carried out on the advice of a Scientific Advisory Council with 13 members who represent the national and international medical scientific communities. The international nature of the Council ensures quality peer review according to the highest standards and facilitates ongoing communications with researchers throughout the world.

The Council and its committees review and advise the Foundation on applications for loans, grants, research projects and professorships.

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THE CHAIRMAN'S REPORT

1985/86 has been another year of progess and growth in the history of the Alberta Heritage Foundation for Medical Research.

Expenditures under the Foundation's program of grants and awards amounted to $43.9 million, an increase of $11.2 million over the preceding year representing a significant increase of 35%. In 1985/86, $5.5 million dollars were expended on institutional grants to the Universitites of Alberta and Calgary for the construction of sorely-needed medical research facilities to ensure that space is available to accommodate the Foundation's programs. Before taking these non-recurring expenditures into account, expenditures in the current year still showed an increase of $5.7 million (18%) over the previous year. These increased expenditures were incurred in virtually every program.

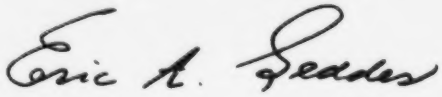
The new medical research buildings, now under construction will cost an estimated $54.8 million, ($46.1 million for planning, design, and construction and $8.7 million for basic completion of laboratories).

In 1980 the Alberta Legislature created an Endowment Fund, with an initial allotment of $300,000,000 to provide a stable funding base for the Foundation's activities. At March 31, 1986 the Endowment Fund stood at $443,000,000 as valued on a cost basis (approximately $515,000,000 on a market value basis). The commendable foresight shown by our legislators in endowing the Foundation has provided the Alberta scientific community with the necessary confidence to plan their future activities and recruit new scientists in the secure knowledge that the necessary funding will be available.

Our Act requires that an International Board of Review be established to report on the impact of the Foundation after six years of operation. This Board consists of seven distinguished medical scientists and is chaired by Dr. John Laidlaw. They have completed their visits to Alberta and will be submitting their report to the Legislature before the end of 1986. The conclusions of this eminent body as to the impact of the Foundation's programs upon medical research in Alberta will be incorporated with the Foundation's Second Triennial Report.

I would like to take this opportunity to thank the Trustees of the Foundation for their unstinting efforts on behalf of the Foundation during the past year.

On behalf of the Trustees, I would like to express our appreciation for the dedicated leadership shown by our president, Dr. Lionel E. McLeod, and for the loyalty and hard work shown by our very fine administrative staff.



Eric A. Geddes
Chairman

The strength and vitality of Alberta's medical research resources (both personnel and technology) have been remarkably strengthened by the programs of the Foundation. By the 6th year of operation, 11 Heritage Medical Scientists, 86 Medical Scholars, and 6 Clinical Investigators have been recruited to the province by The University of Alberta, The University of Calgary, and The Alberta Cancer Board through the Foundation's Grants and Awards. While contributing to a broad range of research needs, the personnel programs offer a career pathway for the young, energetic and interested student who is willing to undertake rigorous research training and is able to produce evidence of strong potential for future success in medical research. Some 350-400 young people in training are funded annually by the Foundation. By this means, the Foundation will contribute to the future supply of well trained medical scientists so desperately needed in Alberta and Canada. The increasing numbers of clinically qualified physicians entering research training ensures that contributions will also be made to the multifaceted interaction among basic and clinical investigators. David A. Hamburg, the former President of the U.S. Institute of Medicine put it succinctly:

"Clinical research remains the vital bridge between advances in basic science on the one hand and improvements in health care - diagnostic, therapeutic or preventive - on the other hand."

The progress of the Foundation's Clinical Fellowship and Clinical Investigatorship program will be nurtured carefully in the coming years.

In keeping with the strong recommendations of its Scientific Advisory Council, the Foundation continues working towards the creation of groups of medical scientists with differing disciplinary backgrounds as well as supporting individual scientists working in less demanding collaborative settings. In 1985/86, a number of multidisciplinary groups reached significant size. They contain not only first class basic scientists, but also clinician scientists who are aware of the problems of illness which must be addressed by research. These clinically qualified scientists bring new expertise and technology to Alberta's patient care services.

Responding to a clear need for new laboratory space for multidisciplinary research groups and in the absence of other funding sources, the Trustees agreed to provide infrastructure grants to The University of Alberta and The University of Calgary for the planning, design and construction of new facilities. Designs were completed during the year and construction will commence on both health science sites in 1986. The design of the buildings and the arrangements for their use will result in efficiency and progress toward the objectives of the Foundation.

A major event of 1985/86 was the implementation of the Foundation's Technology Transfer program. The program provides funds to medical scientists or engineers in Alberta's universities, their affiliated institutions, or to Alberta-based companies with active medical scientists or engineers for the research and development of medically relevant ideas that show strong potential for successful commercialization. The Foundation expects the program to increase interaction between the enlarging medical research community and local industry to their mutual advantage.

THE PRESIDENT'S REPORT

Finally, I wish to acknowledge and express the gratitude of the Foundation, its Trustees and staff, to the great many scientists of Alberta, Canada, and elsewhere who have contributed so willingly and ably to their evaluation of applications for support. Through their help, we will sustain the commitment of the Foundation to excellence.

The unwavering commitment of the Trustees to the affairs of the Foundation ensures its sound accountability and continued progress toward the achievement of its objectives.

Dr. Lionel E. McLeod
President

"Our cancer risk is a product of what we do and who we are."

Dr. Malcolm Paterson

We are reluctantly learning that our environment causes cancer. If we smoke or spend too much time in the hot sun we invite the disease. However, our risk for cancer depends not only on our exposure to carcinogens: it also depends on our genes.

CANCER: IS SUSCEPTIBILITY INHERITED?

Dr. Malcolm Paterson, the newest Heritage Medical Scientist, is internationally recognized for his pioneer research on the heredity of cancer. Dr. Paterson was recruited from the Chalk River Nuclear Laboratories to establish a two-million dollar research program at the Cross Cancer Institute in Edmonton. He explains that there has been relatively little study of how our genetic makeup can influence our susceptibility of cancer, though even lay people have noticed that cancer can run in families.

"Although as many as 90 percent of all human malignancies have been blamed on the environment, by far the most potent risk factor is the genetic component. In the past scientists have disproportionately viewed cancer as caused by the environment to the exclusion of the hereditary factors," says Paterson.

Dr. Paterson studies cancer-prone families and individuals with certain inherited diseases that make them exceptionally susceptible to cancer to see how environmental and hereditary factors interact to cause malignancies. He examines the molecular mechanism underlying the interaction, particularly focusing on the mechanism of DNA repair. In the normal course of living our DNA is damaged by a variety of harmful agents such as ultraviolet rays from the sun. Our cells contain a battery of enzymatic mechanisms that repair this DNA damage. Paterson is discovering these repair mechanisms are faulty in people who have rare hereditary familial diseases that predispose them to cancer. To establish this, he grows skin cells taken from diseased people and their healthy relatives and subjects the tissue cultures to a battery of biological, biochemical and immunological tests of carcinogen response.

This research may lead to screening tests that could be used for genetic and occupational counselling. However, Dr. Paterson and his team have another goal--to understand the fundamental mechanism underlying cancer, which he says is our best hope for prevention. This includes understanding the role of oncogenes. Each oncogene has a normal counterpart called a proto-oncogene, believed to direct the rapid growth of embryonic cells. At birth this normal cell is turned off and remains so until something turns it on again, possibly chemical carcinogens, radiation, or viruses. The oncogene then stimulates cell proliferation.

"I like to use the phrase: we all contain the seed of our own destruction," says Paterson. "What we want to do is explore at the molecular level how radiation, ultraviolet light, and chemical carcinogens are able to turn on proto-oncogenes and how inherited defects can enhance this process and thereby predispose certain people to certain cancers."

Is Cancer Inherited?

If my mother has cancer will I necessarily get it? The equation is not that simple. Cancer has multiple causes in a complex of interactions between heredity and environment.

We do not inherit cancer but we inherit a predisposition toward it. Nor do all carcinogens themselves cause cancer. Some are really pro-carcinogens that have to be metabolized by cellular enzymes into an active form. Paterson's studies indicate some families at high risk have a reduced amount of specific enzymes that apparently detoxify carcinogens.

The Foundation also funds the majority of Dr. Paterson's team including a number of post-doctoral students. Together they are defining how much of our cancer risk depends on what we do and how much depends upon who we are. When that is understood there will be new hope for cancer prevention.

POISONS AT WORK

"Occupational health has been a kind of Cinderella of medicine. When you consider almost every occupation has some hazards, it's amazing how little research is done."

Dr. Francis Green

Work is killing me. For some, that is no idle whining complaint, but the unfortunate truth. Miners, construction workers, people in the manufacturing and petrochemical industries are at high risk for the most common occupational disease—lung disease; and presently there is no cure. Often overlooked, farming is one of the highest risk occupations because grain dust is very toxic. Moreover, because dust is trapped in the lungs forever, lung disease can be latent for 20 or 30 years.

U of C Heritage Scholar Dr. Francis Green has been recruited from the prestigious National Institute of Occupational Health and Safety in the United States to investigate occupational lung disease and help build a strong group of environmental researchers in a province highly dependent upon farming and the petrochemical industry.

Green is studying disease produced by a variety of toxicants including silica, asbestos, uranium dust, and diesel emission. He receives lung samples from across the country and compares his analysis with information on exposure, dose, latency, smoking and demographic figures. This information is then correlated with the presence of small airway disease, fibrosis, emphysema, pulmonary vessel disease and lung cancer.

Green has devised animal studies to see if lung disease can be reversed through pulmonary lavage (washing the lungs) or other means. He also provides diagnostic services at the Foothills Hospital for patients with suspected occupational lung disease.

IS SOME BRAIN DAMAGE REVERSIBLE?

"I'm surprised by my own results and others in the field."

Dr. Roland Auer

The diagnosis of "brain damage" has always meant irreparable injury and loss of function. Following up pioneer work done by Scandanavian scientists, Dr. Roland Auer is accumulating evidence that some types of brain damage may actually be reversible.

The hope comes from new information about brain damage that turns long-accepted theories upside down. For years it was believed that neurons die because they are starved of oxygen or glucose. Brain damage from ischemia (low blood flow to the brain, as in a stroke), or epilepsy or hypoglycemia was thought to be identical. Forefront research now indicates structural brain damage takes different forms in each of the three insults and that neurons do not die selectively because they are starved. They die because they are overexcited by chemical compounds released in the brain.

Prior to becoming a U of C Scholar, Dr. Auer worked with Swedish scientists to develop a new animal model of hypoglycemic brain damage, a condition which most commonly occurs in diabetics who have too much insulin relative to food intake. These studies indicated that "dark" neurons either evolved into dead neurons or recovered completely.

"Dark neurons represent a stage of potentially reversible neuronal injury in tissue," explains Dr. Auer.

He continues to study hypoglycemia and is also investigating ischemia cavitation from strokes where nerve and supporting cells are both destroyed, creating an irreparable cavity in the brain. If only the neurons were destroyed there would be a chance of repair because the surviving cells could sprout new connections like strawberry runners. ⬢

BREAKTHROUGH IN MAPPING THE BRAIN

"This work is spectacular. I've not seen anything like it in this field for years. It really is revolutionary. The technique allows us to do things we were only able to do in a clumsy way before."

Dr. David Hubel
Nobel Laureate in Medicine (1981)

Dr. Hubel is describing the work of Gary Blasdel, who joined the U of C as a Heritage Medical Scholar this year. Recruited from The University of Pittsburgh, Blasdel has discovered a new way to watch the brain at work. He uses voltage sensitive dyes to track activity patterns of neurons in the primary visual cortex located at the back of the brain.

An anesthetized monkey watches electronic patterns on a television screen. At the same time, a television camera mounted above watches the reaction of the monkey's brain, specifically the visual cortex. This TV image is then processed by a computer where it is translated into numbers and finally into another visual image, a map of the brain at work.

The final image looks like photographs of great-grandmother's patch-work quilt. Each colored "patch" or module indicates certain neurons processing specific types of visual information.

Using his new technique, Blasdel has discovered a unit of cortical organization that may partly explain how our brain processes visual information. He has found a patchwork of modules that package orientation and occular dominance. Scientists have long suspected such modules exist, but this is the first evidence.

Medical Application

The voltage-dye technique gives researchers an invaluable tool for all cortical research. With the old electron microde method, information only covers a single axis, whereas Blasdel's technique allows analysis of cortical activity over a two-dimensional surface. He explains, "with the old method it was an overwhelming task to take 10 or 20 recordings, but with this technique you can look at 16,000 different points simultaneously".

The technique may prove to be invaluable to brain surgeons treating epileptics. Blasdel expects the dye could be used to allow brain surgeons to clearly identify the epileptic cells prior to removing them. Presently there is no accurate way to precisely identify the affected areas of the brain, so sometimes extra tissue may be unnecessarily removed.

The technique could also advance research related to cortical diseases such as Alzheimer's Disease. A group of scientists at Yale have approached Dr. Blasdel about collaborating on investigations of some 30-year old primates who have begun to exhibit the symptoms of Alzheimer's. Blasdel's technique could help researchers determine what goes wrong in the brain cells when the disease occurs. ●

DIABETES: THE TRANSPLANT SOLUTION

"There is no greater motivation than seeing young diabetics. I'd like to help these children before they get the terrible complications of the disease."

Dr. Garth Warnock

U of A Heritage Clinical Investigator Dr. Garth Warnock gets letters from desperate diabetics in Edmonton and across the country. Despite careful treatment, these people are threatened with severe kidney problems, blindness and other serious complications as the disease progresses. Can Dr. Warnock help them with the new transplant therapy?

Pancreatic islet cell transplantation is still in the experimental stage, but Dr. Warnock predicts the therapy could be available in Edmonton within two years. His work is directed toward making the process safe and effective.

Unlike traditional organ transplants, the whole organ—in this case the pancreas—is not replaced. (600 pancreatic transplants done worldwide have achieved a success rate of about fifty percent.) Instead only the insulin-producing cells are injected into the patient, a procedure that is simpler and safer because the cells can be treated to minimize rejection. The islet cell transplantation has reversed diabetes in animals and a few human trials have been partially successful.

Two years ago Dr. Warnock studied with a team at Oxford University who pioneered much of the work on the therapy. They all feel strongly that more animal work must be done to solve two major problems: harvesting an adequate number of cells and controlling rejection. Warnock's research focuses on solving these problems. In collaboration with the Oxford group, he has developed an improved method of harvesting the islets using an enzyme that digests the unwanted tissue surrounding the islets. With U of A cryopreservation expert Dr. Ray Rajotte, Warnock is perfecting methods of freezing the islet cells. This reduces the possibility of rejection because tissue can be banked until a compatible donor is found. It appears that eliminating leukocyte cells from the islet graft may also prevent rejection because these are the cells thought to trigger the rejection response.

As a clinical investigator Dr. Warnock spends a quarter of his time caring for patients at the Edmonton General Hospital.

He is one of six clinical investigators, a program designed to encourage physicians to conduct research.

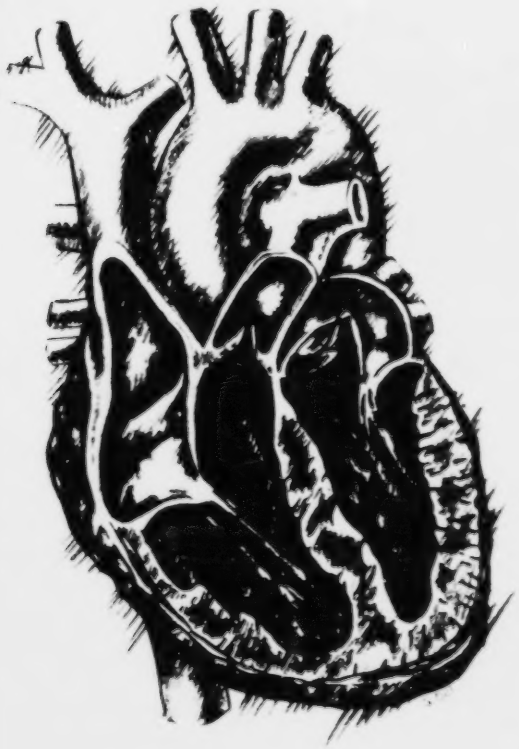
"Without the support of the Foundation a person like me would not be in this position—I would be devoted to full-time surgery," says Dr. Warnock. ●

"Eventually we may be able to develop new treatments for people at risk for sudden cardiac death and prevent it."

Dr. Frank Witkowski

A fifty-year old man arrives at the University of Alberta Hospital. His friends have rushed him there minutes after he collapsed on the golf course. The man has a blocked artery and the rapid, chaotic heart rhythm called ventricular fibrillation (VF) which may produce a heart attack.

At the hospital he could be cared for by cardiac specialist, Dr. Frank Witkowski. After clinical duty Dr. Witkowski would return to his laboratory where, as a Heritage Medical Scholar, he seeks to understand precisely what happened on the golf course. Dr. Witkowski is tracking down the mechanisms of sudden cardiac death so that one day, people who have been identified at high risk for heart attacks may be given preventative treatment.



Dr. Witkowski studies sudden cardiac death from the point of view of the autonomic nervous system. There is considerable experimental and clinical evidence to suggest that the system influences whether or not VF occurs with a heart attack or with sudden flow restoration after coronary artery blockage. Using animals models, Dr. Witkowski tracks the electrophysiological

COUNTERATTACK

alterations in the walls of the heart chambers as they are influenced by each branch of the autonomic nervous system. He is able to do so because he has devised an automated cardiac mapping system which gives him cardiac electrogram information from hundreds of recording sites simultaneously. An engineer prior to becoming a physician, Dr. Witkowski has devised specialized equipment which gives him access to previously unavailable information from the heart muscle wall.

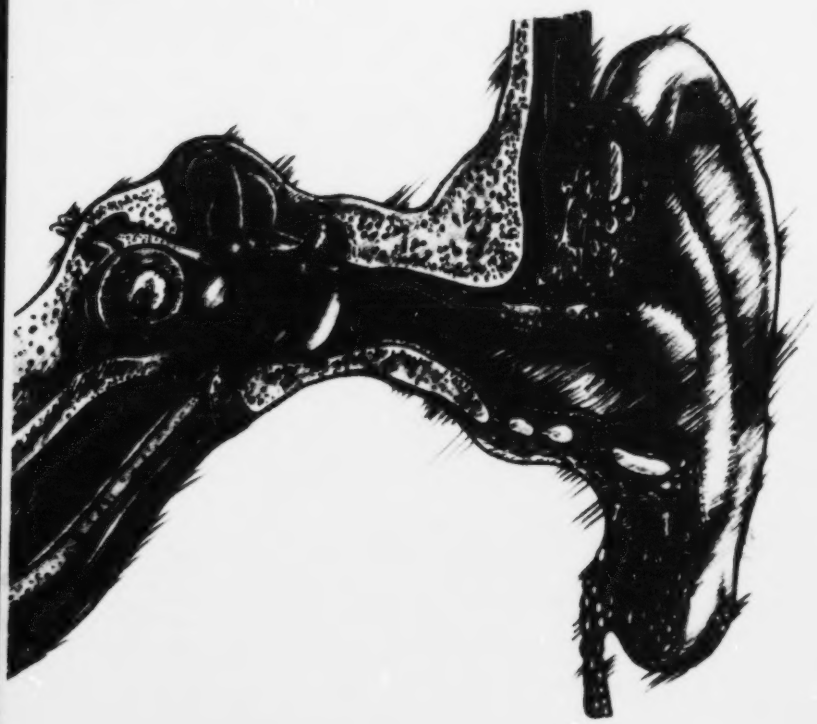
The equipment is also invaluable during certain types of cardiac surgery. "With a single heart beat of supraventricular tachycardia we can have a complete diagnosis in the operating room," explains Dr. Witkowski.

"Caring for the patients gives me insight as to why I am doing this research," he adds. "When I see people with VF it gives my research impetus. It's exciting to know the work I do could be clinically applied and to know that in five years I might be able to help these people." ●

"We ignore the miracle of the ear which conveys images that are far deeper, more subtle, more penetrating than the eye....Sound goes directly into our bodies. What the aural can do to the inside of our brains, to the 'within' of our lives, nothing else can do."

Yehudi Menuhin

CAN HEARING BE REGAINED?



If we found the right sounds, could we arouse a deaf ear? Could a deaf child's auditory system be "taught" to hear just as the mind is "taught" to think?

Dr. Jos Eggermont tends to say "yes" and if he is correct, radical new therapies will be possible for rehabilitation after hearing loss. Dr. Eggermont points out there is plenty of evidence that the auditory system is plastic. Major developmental changes have been demonstrated for single neuron properties in the auditory and visual system and for organizational changes in the visual system. Dr. Eggermont aims to demonstrate changes in cooperative action among auditory neurons during development and learned tasks.

He does this by simultaneously recording a small number of neurons in the auditory system of the developing and adult cat. He also measures changes in auditory neural activity in frogs during hormonal treatment. (Because lady frog doesn't hear an over-enthusiastic Mister Frog's mating call, if it isn't mating season, this is an example of how changing stimuli produce changes in neural activity.)

Dr. Eggermont's work will have immediate clinical application which will add to a long record of contributions. Internationally recognized for his expertise in electrocochleography, he pioneered the use of electrodes to measure hearing in the inner ear and refined another technique so that it could be accurately used to detect tumors of the auditory nerve. Prior to his U of C appointment as a Heritage Medical Scholar, Dr. Eggermont was based at the University of Leyden in his native Netherlands.

His current research will have significance for accurately monitoring hearing in neonates. Understanding the individual differences in auditory plasticity may also explain why the new ear implants work for some people, but not others. This research could lead to exciting developments in artificial auditory stimulation of the profoundly deaf and perhaps even to sound therapy for the developing child with hearing problems.

In the future some prospective parents may purchase crib, diapers, stroller, and a miniature Walkman for darling baby, complete with tapes of special sound frequencies. However it's not likely Eggermont's research will answer all the detailed questions such as: Is Mozart or Madonna more therapeutic for Baby? ●

"It is as much the business of the physician to alleviate pain and smooth the avenues of death when it is unavoidable, as it is to cure disease."

Dr. John Gregory

Call him Joe. He suffers from the pain of advanced bowel cancer. Three years ago he would have spent the last months of his life at the Cross Cancer Institute just so his pain could be controlled. Instead, Joe is an outpatient, able to live at home because of a unique device, a disposable plastic pump used to administer narcotics under the skin.

The pump was originally designed to administer chemotherapy intravenously and Heritage Clinical Fellow Dr. Eduardo Bruera adapted it for narcotic administration. Bruera is a researcher for the Cross Cancer Institute Symptom Control Team headed by Dr. Neil MacDonald.

The adaptation of the pump for outpatients has been a particularly satisfying research project because it has directly improved the quality of patients' lives. It is only one of several clinical studies on symptom control conducted by the team at the Cross. For example, Bruera is investigating the use of a drug called methylphenidate to counteract the sleepiness produced by narcotics.

He explains, "With narcotics there is a narrow window opening between the highest dose needed to control pain and the lowest dose possible to avoid undesirable effects such as drowsiness and confusion. We're trying to open that window wider and take the ceiling dose of narcotics higher."

Bruera is also exploring better drugs to prevent and treat chronic nausea, a major problem in advanced cancer patients.

Dr. Bruera feels strongly about the need for more clinical research on pain and other symptoms of terminally-ill patients. Such research is difficult because it involves many variables as well as ethical considerations, but it is not impossible.

"Though precise measurement of pain is extremely difficult, this has been used as an excuse to neglect serious scientific research in the area," he says. "To say that you can't measure pain is more an excuse than a reality. If you treat pain and nausea every day you have to measure them so you can treat them. Of course, this is not as easy as measuring blood pressure or blood sugar.

"We have to design scientific projects for accurate measurement. We need many more highly trained people in clinical research. If funding agencies are willing to provide money for palliative care research, people will be oriented to it."

Dr. Eduardo Bruera is one of 29 Clinical Fellows funded by the Foundation. The clinical research program is specially designed to attract physicians to research by providing adequate funding and the opportunity to learn the necessary skills from established investigators. ●

PAIN CONTROL

ORGAN TRANSPLANTS: THE ISSUES

"Sometimes the public doesn't understand it's not the 'Coma' script being written and played out. There are safeguards and problems, misperceptions and tremendous opportunities, all rolled into one emotion."

Dr. Gary Friedlaender
President, American Council on Transplantation

Dr. Friedlaender was speaking at the International Symposium on Organ Transplantation held at Banff in May 1985. He was one of 17 speakers who examined the challenging moral, ethical, legal, medical,and political issues surrounding organ transplantation.

Organ transplantation is a science fiction fantasy come true—repairing diseased body parts with healthy ones to give new life. However, there is a gap between supply and demand and filling the gap is no easy task. Can the public be persuaded to donate more organs? What laws ought to govern the donation process to safeguard the doctor, patient, and the donor's family? With a shortage of donors who decides who shall receive a life-giving heart or kidney and who shall die waiting for one? With limited health care resources can we afford mass transplantation?

At the Lake Louise conference participants explored solutions to everything from the most practical way to use computers in the distribution of organs among countries to debates on the nature of "Medical Progress and the Human Soul" stimulated by keynote speaker Malcolm Muggeridge.

This conference was one of 11 conferences and workshops sponsored by the Foundation wholly or in cooperation with other sponsors. Conference funds provide travel expenses to bring national and international experts to Alberta for an exchange of scientific information. ●

FROM LABORATORY TO MARKETPLACE

A new technology transfer program promotes University-Industry collaboration

Medical researchers generate ideas but lack the time and expertise to take them to the marketplace where they can be made available for patient care. Industrialists know how to market innovations if they can find them. The new AHFMR Technology Transfer Program brings the two groups together. Grants fund the awkward stage when a promising scientific idea has not been developed enough to attract investment capital. Foundation President, Dr. Lionel McLeod explains:

"We believe there are opportunities for commercialization that have not been exploited and we're hoping to bring forward an idea far enough that it will attract high risk investors."

Phase I grants provide $25,000 to establish the feasibility of a promising concept arising from a scientist's ongoing research or the research of others.

Phase II grants of $75,000 apply when a product or technique has been identified and laboratory tested but requires further investigation and refinement to attract seed-venture capital.

Applicants may be required to enter into an agreement for repayment should the venture be successful.

Grants are not restricted to university personnel. Any engineer or scientist in an Alberta-based business is eligible to apply. A maximum of six Phase I grants and six Phase II grants are given annually. Applications are evaluated by a committee of medical researchers, AHFMR Trustees, and representatives from the business community.

The first four innovations funded demonstrate the creativity of Alberta scientists and the promise for industrial development: a design for an artificial pancreas and kidney, a therapeutic mask for a sleeping disease, a series of new antiviral drugs including one to fight the common cold, and a pharmaceutical company specializing in the manufacturing of peptides.

"If you look back over the history of basic research, it takes an average of 10 to 20 years for new knowledge to be applied to patient care. We hope our new program will shorten that time gap," says McLeod.

(continued...)

Designing an Artificial Pancreas and Kidney

Heritage Scholar Dr. Henry Koopmans at The University of Calgary has designed an artificial pancreas and kidney using a new principle which will remain confidential for patent purposes. His Phase I grant will be used to produce a workable prototype out of biocompatible plastic and test it on animals for tissue and blood compatibility. (Phase I Grant).

Therapeutic Mask for Sleeping Disease

Heritage Medical Scientist Dr. John Remmers at The Univeristy of Calgary researches a common disorder called sleep apnea which makes a sleeper unable to breathe because his air passage is totally blocked. Affecting 1-2% of the population, it causes many serious problems including high blood pressure, depression, impotence, and mental deterioration. It can lead to loss of job through sleepiness and in severe cases causes heart failure. Snoring is one symptom.

Though surgery is sometimes effective, there is no drug therapy. Dr. Remmers has developed two generations of a nasal airway positive pressure system (NAPP) which is highly effective in treating patients. However it is cumbersome, noisy, and somewhat uncomfortable. His Phase I grant will be used to develop a third generation NAPP system that is compact, silent, and uses a universal mask that will comfortably deliver air pressure to the nose. Remmers anticipates the new mask will be successful in the marketplace and superior to the only other NAPP system available in North America. (Phase I Grant).

New Antiviral Drugs

Dr. Ronald Micetich, a pharmacist at The University of Alberta, has discovered a series of compounds which are highly effective against herpes simplex virus Class I in tissue culture. Also, the compounds potentially have a broad spectrum of activity against a variety of viruses including herpes, picornavirus and rhinovirus (the common cold). These new compounds are a new class of antiviral agents called arildone derivatives. Dr. Micetich believes they will be superior to many commonly used antiviral agents because they have a broader spectrum (to attack more viruses). The new compounds appear to have two other advantages: They can be used as topical agents so they needn't be taken orally and they may be able to fight the new strains of viruses that are resistant to current antiviral drugs.

Dr. Micetich's Phase II grant will be used to further test the effectiveness of the compounds to the point where interested pharmaceutical companies could develop the drugs for the marketplace. (Phase II Grant).

Developing a Pharmaceutical Company for Peptide Manufacturing

Dr. Robert Hodges, of the Department of Biochemistry at The University of Alberta is known for his expertise in developing synthetic peptides and vaccines. Peptides are naturally-occurring substances which regulate many basic bodily processes. In the last ten years chemists have learned to synthesize peptides in the lab and make: synthetic vaccines which are safer and more effective than vaccines made from killed viruses; antibodies used for research and diagnosis of disease; and drugs (particularly the peptides that act as hormones or neurotransmitters to control reproduction, appetite, pain, sleep, learning and response to stress and infection).

Dr. Hodges estimates that by the year 2000, $9 billion of the projected $64 billion market for biotechnology products will be in the area of hormones, blood products and other related peptide products. His Phase II grant will be used to study the feasibility of forming a company for the production, formulation and manufacturing of synthetic peptides and related products.

Dr. Hodges and fellow biochemist Dr. Robert Parker have formed a partnership with businessman Jerome McElroy to market a process for synthesizing peptides. They have marketed a working plan for Synthetic Peptide Inc. to government and potential private investors. It will be the first Canadian owned and controlled pharmaceutical company in the peptide field. ●

Heritage Medical Scientist Awards

This award was established to encourage the recruitment and establishment of senior medical scientists to Alberta. A Heritage Medical Scientist is a leader in his field and is internationally recognized for his scientific contributions.

Alberta investigators with a record of outstanding research, whose stipend from competitive funding agencies (MRC, NSERC, AHFMR, etc.) is scheduled to terminate are also eligible.

Scholarships

Alberta Heritage Medical Research Scholarships support investigators recently trained in medical research who have demonstrated promise and ability to initiate and conduct independent research. A five-year, renewable Scholarship allows scientists to develop medical research unhampered by heavy teaching and service duties.

Scholarships are granted by competition and based upon the excellence of the candidate, the originality and importance of the project, and the quality and adequacy of the proposed research environment.

Clinical Investigatorships

Clinical Investigatorships give clinically qualified medical scientists holding full-time academic appointments further research training and experience assisted by competitively-funded basic or clinical researchers. Clinical investigators must have an M.D. or D.D.S., have completed clinical specialty training and two or three years of supervised medical research. The three-year award may be extended for two years but is not renewable.

Independent Establishment Grants For New Investigators

Heritage Medical Research Independent Establishment Grants are given to new investigators who are not funded by the Foundation (who may or may not hold an award from another research granting agency). This grant is designed to help new investigators quickly achieve maximal research productivity by providing equipment, technical assistance, materials and supplies.

Fellowships

Heritage Medical Research Fellowships provide qualified candidates with full-time postgraduate training in research in an area of medical science relevant to the aims of the Foundation. Fellows must have an M.D., D.D.S., D.V.M., Ph.D., or equivalent degree and must demonstrate high academic standing and evidence of research ability.

Clinical Fellowships

Clinical Fellowships give individuals who have completed clinical training an opportunity to gain supervised medical research experience. The applicant must have a medical or dental degree obtained within the last ten years and have completed subspecialty clinical training. The one year award may be renewed three times.

GRANTS AND AWARDS

Studentships

The Foundation provides three types of awards: Full-time, Part-time, and Summer Studentships.

There are a limited number of Full-Time Studentships for students registered in full-time M.Sc. or Ph.D. programs, and who plan careers in medical research.

The University must accept students into a graduate program and invite students to apply for an AHFMR Studentship. Studentships are granted by competition and awards are made on the basis of excellence.

A limited number of Part-Time Studentship awards are available to full-time students working towards professional health-related degrees, and seeking to spend substantial amounts of free time in medical research. Research required by the curriculum is not eligible for support.

Summer Studentship awards support promising Alberta university students who wish to spend their summer months (May to August) engaged in medical research.

Research Allowances
(Independently Funded Students & Fellows)

Holders of full-time Studentships and Fellowships awarded by another research agency using similar guidelines and standards are eligible to apply to the Foundation for a Research Allowance.

Technology Transfer Grants

The Technology Transfer Program is designed to provide a unique opportunity for Alberta medical researchers or engineers to promote university/industrial collaboration in Alberta, stimulate technological innovation in Alberta, and advance medical research to the stage where private investors may provide seed capital.

Phase I grants enable applicants to strengthen the technical merit and explore the feasibility of a scientifically sound project.

Phase II grants apply when a product or technique has been identified and laboratory tested but requires further investigation and refinement to attract seed/venture capital.

Visiting Scientists

Awards for Visiting Scientists to Alberta enable a limited number of highly innovative and productive medical scientists to engage in medical research in an Alberta university for the purpose of bringing special knowledge and expertise to the host, department, group, or institution.

Awards for Visiting Scientists from Alberta enable Alberta medical scientists to undertake collaborative research which they are unable to undertake locally due to inadequate technology or collegial expertise. Research funded must be an obvious step in the progression of a sustained research effort on the part of the Visiting Scientist.

The program allows Alberta's active researchers to participate in new and important breakthroughs in medical research emerging elsewhere.

Conference Grants

The Foundation supports a limited number of conferences and workshops clearly related to the enhancement of medical research in Alberta and the transmission of significant new knowledge to those responsible for the management of patients.

Conference support is usually limited to the funding of a small number of distinguished medical scientists invited to participate as special lecturers or major participants. Funds also support a limited number of workshops on collaborative research and workshops which explore and evaluate new research findings.

Visiting Lecturers

The Visiting Lecturer program helps Alberta universities attract outstanding medical scientists who can broaden and enrich the educational experience of graduate students and fellows. The program also gives Alberta investigators, individually or in groups, the opportunity to discuss their research with other experts in their field of medical research.

Travel Grants

The Foundation annually gives Travel Grants to The University of Alberta and The University of Calgary to be administered by the Universities for the following purposes:

- Attendance of faculty members at workshops, conferences and annual meetings.
- Recruitment of researchers.
- Short visits to discuss complicated experimental design and cooperative research and prepare publications stemming from cooperative research.
- Short vists to other laboratories to study new research procedures and techniques and to host external investigators who can assist in the establishment of procedures and techniques.

Visiting Professors

Heritage Medical Research Visiting Professorships are available for the purpose of recognizing and attracting truly outstanding medical scientists to visit Alberta to enrich and enhance the climate of medical research within the universities and the affiliated institutions active in medical research.

Grants for Major Equipment

Major Equipment grants permit the university on behalf of investigators to purchase equipment essential to high-quality research. Applications usually relate directly to research projects supported by competitive granting agencies.

Grants for Equipment Maintenance ensure adequate maintenance of major equipment wholly funded by the Foundation's Major Equipment Grants. Preferential consideration is given to expensive facilities providing support to groups of researchers and multidisciplinary projects, especially those facilities offering services to researchers with partial or full recovery arrangements for regular operating costs.

For details on expenditures in each grant category, see Tables 1-4.

New Grants and Awards Implemented — 1985-86

TABLE 1

Award Category	Number and Value of Grants and Awards* U of A	U of C	Others	Totals
Studentship				
- Full-Time	$ 564,330 (39)	$ 506,450 (35)	$ –	$1,070,780 (74)
- Part-Time	10,370 (3)	3,990 (1)	–	14,360 (4)
- Summer	466,503 (124)	295,843 (76)	12,000 (3)	774,346 (203)
Fellowship				
- Full-Time	976,855 (34)	1,027,955 (36)	400,990 (14)	2,405,800 (84)
- Part-Time	–	30,812 (3)	–	30,812 (3)
Independent Research Allowance				
- Studentship	12,500 (5)	2,500 (1)	–	15,000 (6)
- Fellowship	–	21,700 (5)	8,700 (2)[1]	30,400 (7)
Clinical Fellowship	147,650 (3)	283,205 (6)	332,238 (7)	763,093 (16)
Clinical Investigatorship/ Establishment Grant	193,560 (1)	97,667 (1)	–	291,227 (2)
Clinical Traineeship	–	47,067 (1)	–	47,067 (1)
Scholarship/Establishment	2,137,089 (7)	3,798,406 (13)	–	5,935,495 (20)
Heritage Medical Scientist/ Establishment Grant	–	–	1,041,606 (1)[2]	1,041,606 (1)
Independent Establishment Grant	829,726 (1)	–	–	829,726 (1)
Major Equipment Grant	929,794 (16)	274,218 (9)	–	1,204,012 (25)
Conference Grant	82,800 (4)	46,190 (5)	40,350 (2)	169,340 (11)
Technology Transfer Grant Phase I	–	50,000 (2)	–	50,000 (2)
Visiting Scientist To Alberta	19,950 (1)	33,500 (2)	–	53,450 (3)
Visiting Scientist From Alberta	5,000 (1)	21,220 (1)	–	26,220 (2)
Visiting Professor	7,664 (6)	5,196 (4)	–	12,860 (10)
TOTALS	**$6,383,791 (245)**	**$6,545,919 (201)**	**$1,835,884 (29)**	**$14,765,594 (475)**

Notes: * - Values shown are committed amounts on the effective date of award.
1 - Includes $2,500 per Full-Time Studentship and Part-Time Fellowship awards, and $5,000 per Full-Time Fellowship awards.
2 - Cross Cancer Institute awards.

Summary of Applications Received and Processed During 1985-86 Award Year

TABLE 2

Award Category	Number of Applications Processed															
	U of A				U of C				Others				Totals			
	Total	A	R	O	Total	A	R	O	Total	A	R	O	Total	A	R	O
Studentships																
- Full-Time	85	35	49	1	69	30	39	—	3	—	3	—	157	65	91	1
- Part-Time	1	1	—	—	3	1	1	1	—	—	—	—	4	2	1	1
- Summer	168	99	66	3	113	73	40	—	6	4	2	—	287	176	108	3
Fellowships																
- Full Time	74	38	35	1	56	25	26	5	28	18	9	1	158	81	70	7
- Part-Time	1	1	—	—	5	3	2	—	—	—	—	—	6	4	2	—
Independent Research Allowance																
- Studentship	13	9	4	—	3	2	1	—	—	—	—	—	16	11	5	—
- Fellowship	2	1	1	—	3	1	1	1	—	—	—	—	5	2	2	1
Clinical Fellowship	10	5	5	—	14	7	6	1	7	5	2	—	31	17	13	1
Clinical Investigatorship/ Establishment Grant	5	2	1	2	2	2	—	—	—	—	—	—	7	4	1	2
Scholarship/Establishment	18	8	9	1	19	11	7	1	1	—	1	—	38	19	17	2
Heritage Medical Scientist/ Establishment Grant	2	1	1	—	—	—	—	—	—	—	—	—	2	1	1	—
Independent Establishment Grant	6	3	3	—	4	1	3	—	—	—	—	—	10	4	6	—
Major Equipment Grant	34	17	16	1	23	11	12	—	—	—	—	—	57	28	28	1
Conference Grant	2	2	—	—	2	2	—	—	—	—	—	—	4	4	—	—
Technology Transfer Grant Phase I	5	—	5	—	4	2	2	—	1	—	1	—	10	2	8	—
Technology Transfer Grant Phase II	4	2	2	—	2	1	1	—	1	1	—	—	7	4	3	—
Visiting Scientist To Alberta	4	1	3	—	5	4	1	—	—	—	—	—	9	5	4	—
Visiting Scientist From Alberta	1	—	1	—	4	2	2	—	—	—	—	—	5	2	3	—
Visiting Professor	3	3	—	—	4	4	—	—	—	—	—	—	7	7	—	—
TOTALS	**438**	**228**	**201**	**9**	**335**	**182**	**144**	**9**	**47**	**28**	**18**	**1**	**820**	**438**	**363**	**19**

A = Approved R = Rejected O = Withdrawn/Pending

Grants and Awards Renewed/Continued — 1985-86

TABLE 3

	Number of Grants and Awards Renewed/Continued			
Award Category	**U of A**	**U of C**	**Other**	**Totals**
Studentship				
- Full-Time	97	65	5	167
- Part-Time	—	1	—	1
Fellowship				
- Full-Time	77	47	19	143
- Part-Time	2	6	—	8
Independent Research Allowance				
- Studentship	6	7	2	15
- Fellowship	—	1	6	7
Clinical Fellowship	2	3	8	13
Clinical Investigatorship	3	1	—	4
Heritage Scholarship	27	46	—	73
Heritage Scientist	2	8	—	10
Independent Establishment Grants	6	4	—	10
TOTALS	**222**	**189**	**40**	**451**

Total Awards Active on March 31, 1986

TABLE 4

	Number of Grants and Awards			
Award Category	**U of A**	**U of C**	**Other**	**Totals**
Clinical Investigatorship	4	2	—	6
Heritage Medical Scientist	2	8	1	11
Heritage Scholarship	33	59	—	92
TOTALS	**39**	**69**	**1***	**109**

* Cross Cancer Institute

APPLICATIONS ADVISORY COMMITTEE MEMBERS

DR. W.L. ALBRITTON, Professor and Head, Dept. of Microbiology, Faculty of Medicine, U of Sask.

DR. PETER ALLEN, Professor, Dept. of Applied Sciences in Medicine, Faculty of Medicine, U of A.

DR. MARVIN BALA, Professor & Head, Dept. of Medicine, University Hospital, Saskatoon, Sask.

DR. MARK BISBY, Professor, Dept. of Medical Physiology, Faculty of Medicine, U of C.

DR. W.A. BRIDGER, Professor, Dept. of Biochemistry, Faculty of Medicine, U of A.

DR. L. BRYAN, Professor & Head, Dept. of Microbiology & Infectious Diseases, Faculty of Medicine, U of C.

DR. JOHN COLTER, Professor & Chairman, Dept. of Biochemistry, Faculty of Medicine, U of A.

DR. JOE DAVISON, Dept. of Medical Physiology, Faculty of Medicine, U of C.

DR. GRANT GALL, Professor, Dept. of Pediatrics, Faculty of Medicine, U of C.

DR. TESSA GORDON, Associate Professor, Dept. of Pharmacology, Faculty of Medicine, U of A.

DR. DAVID HART, Chairman, Immunological Sciences Research Group, Dept. of Microbiology & Infectious Diseases, Faculty of Medicine, U of C.

DR. ROSS HODGETTS, Professor, Dept. of Genetics, Faculty of Science, U of A.

DR. G. HOLLAND, Associate Professor, Dept. of Restorative Dentistry, Faculty of Science, U of A.

DR. SUSAN JENSEN, Associate Professor, Dept. of Microbiology, Faculty of Medicine, U of A.

DR. E. KNAUS, Professor, Faculty of Pharmacy & Pharmaceutical Sciences, U of A.

DR. YVONNE LEFEBVRE, Associate Professor, Dept. of Medical Biochemistry, Faculty of Medicine, U of C.

DR. CATHERINE LORD, Associate Professor, Dept. of Pediatrics, Faculty of Medicine, U of A.

DR. S.F. PAUL MAN, Professor, Division of Pulmonary Medicine, Faculty of Medicine, U of A.

DR. ERNEST McCOY, Professor, Dept. of Pediatrics, Faculty of Medicine, U of A.

DR. W. PARANCHYCH, Professor, Dept. of Biochemistry, Faculty of Medicine, U of A.

DR. KEIR PEARSON, Professor, Dept. of Physiology, Faculty of Medicine, U of A.

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DR. FRED QUANDT, Assistant Professor, Depts. of Medical Physiology and Anatomy, Faculty of Medicine, U of C.

DR. HARVEY R. RABIN, Professor, Dept. of Microbiology & Infectious Diseases, Faculty of Medicine, U of C.

DR. R. REITHMEIER, Associate Professor, Dept. of Biochemistry, Faculty of Medicine, U of A.

DR. JOHN REMMERS, Professor, Depts. of Medicine and Physiology, Faculty of Medicine, U of C.

DR. D.A.K. RONCARI, Julia McFarlane Professor of Diabetes Research, Faculty of Medicine, U of C.

DR. AIMO SALMI, Professor, Dept. of Medical Microbiology, Faculty of Medicine, U of A.

DR. N. SCHACHAR, Associate Professor, Dept. of Surgery (Orthopedics), Faculty of Medicine, U of C.

DR. GILBERT SCHULTZ, Professor, Assistant Dean of Research, Dept. of Medical Biochemistry, Faculty of Medicine, U of C.

DR. DAVID SEVERSON, Associate Professor, Dept. of Pharmacology, Faculty of Medicine, U of C.

DR. MICHAEL SMITH, Professor, Dept. of Biochemistry, Faculty of Medicine, UBC.

DR. RICHARD STEIN, Professor, Dept. of Physiology, Faculty of Medicine, U of A

DR. JOHN TYBERG, Professor, Dept. of Internal Medicine and Medical Physiology, Faculty of Medicine, U of C.

DR. DAVID. L. TYRRELL, Head, Dept. of Medical Microbiology, Faculty of Medicine, U of A.

DR. WARREN VEALE, Professor & Head, Dept. of Medical Physiology, Faculty of Medicine, U of C.

DR. JOEL WEINER, Professor, Dept. of Biochemistry, Faculty of Science, U of A.

DR. WANDA WENMAN, Associate Professor, Dept. of Pediatrics, Faculty of Medicine, U of A.

DR. FRANK WITKOWSKI, Assistant Professor, Division of Cardiology, Dept. of Medicine, Faculty of Medicine, U of A.

DR. DON WOODS, Associate Professor, Dept. of Microbiology & Infectious Diseases, U of C.

DR. GEORGE WYSE, Professor, Depts. of Medicine and Pharmacology & Therapeutics, Faculty of Medicine, U of C.

ALBERTA HERITAGE FOUNDATION FOR MEDICAL RESEARCH

FINANCIAL STATEMENTS MARCH 31, 1986

AUDITOR'S REPORT

To The Trustees of the Alberta Heritage Foundation for Medical Research

I have examined the balance sheet of the Alberta Heritage Foundation for Medical Research as at March 31, 1986 and the statements of revenue and expenditure and revenue surplus for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, these financial statements present fairly the financial position of the Foundation as at March 31, 1986 and the results of its operations for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Donald N. Salmon

C.A.
Auditor General

Edmonton, Alberta
June 13, 1986

Balance Sheet as at March 31, 1986

	1986	1985
ASSETS		
Cash	$5,511,095	$5,084,677
Accounts receivable (Note 4)	153,138	113,089
Accrued interest receivable	3,446	4,950
Prepaid expenses	20,858	8,981
Mortgages receivable from research scientists	670,653	588,396
Fixed assets	271,757	350,153
	$6,630,947	**$6,150,246**
LIABILITIES AND SURPLUS		
Accounts payable	$1,707,742	$1,499,338
Revenue surplus	4,923,205	4,650,908
	$6,630,947	**$6,150,246**

The accompanying notes are part of these financial statements.

Statement of Revenue and Expenditure for the year ended March 31, 1986

	1986	1985
REVENUE		
Transfers from the Alberta Heritage Foundation for Medical Research Endowment Fund	$45,000,000	$32,000,000
Interest	580,725	640,534
	45,580,725	**32,640,534**
EXPENDITURE		
Scientific affairs:		
Scholarship and establishment grants	9,873,094	6,950,395
Fellowship grants and research allowances	6,781,100	6,660,212
Building program grants	5,496,000	750,000
Studentship grants and research allowances	4,056,986	3,670,918
Heritage medical scientist grants	3,735,616	3,184,706
Major equipment and maintenance grants	3,462,611	3,419,863
Institutional grants	3,394,433	2,176,863
Research support costs	2,572,272	2,252,069
Clinical fellowship grants	1,231,857	713,911
Independent establishment grants	1,147,464	1,282,044
Clinical investigatorship grants	677,360	490,756
Visiting lecturer grants to universities	368,883	340,375
Conference support grants	248,121	300,545
Travel grants to universities	198,752	205,953
Special initiative funding	186,071	25,358
Visiting scientist grants	183,748	146,802
Independent research allowances	111,876	105,973
Technology transfer grants	55,000	—
Clinical trainee grants	40,957	—
Recruitment and planning grants to universities	25,888	28,735
Visiting professor honoraria and travel grants	23,170	16,463
Research professor-in-residence	7,444	26,056
	43,878,703	**32,747,997**
Administration expenses, Schedule 1	1,023,578	963,279
Scientific Advisory Council expenses	156,674	138,858
Trustee expenses	142,947	112,609
Other committee expenses	106,526	71,325
	45,308,428	**34,034,068**
Operating surplus (deficit) for the year	**$ 272,297**	**$(1,393,534)**

Statement of Revenue Surplus for the year ended March 31, 1986

	1986	1985
Revenue surplus at beginning of year	$4,650,908	$6,044,442
Operating surplus (deficit) for the year	272,297	(1,393,534)
Revenue surplus at end of year	**$4,923,205**	**$4,650,908**

Notes to the Financial Statements , March 31, 1986

NOTE 1

Authority

The Alberta Heritage Foundation for Medical Research operates under the authority of the Alberta Heritage Foundation for Medical Research Act, Chapter A-26, Revised Statutes of Alberta 1980.

NOTE 2

Significant Accounting Policies and Reporting Practices

Fixed Assets:

Fixed assets are stated at cost less accumulated depreciation and amortization.

Changes in Financial Position:

A statement of changes in financial position is not provided as disclosure in these financial statements is considered to be adequate.

NOTE 3

Alberta Heritage Foundation for Medical Research Endowment Fund

The Endowment Fund operates pursuant to section 7 of the Alberta Heritage Foundation for Medical Research Act and consists of an initial endowment of $300,000,000 from the Alberta Heritage Savings Trust Fund together with cumulative earnings thereon, less cumulative transfers to the Foundation.

Transfers to the Foundation are available upon request provided the payment of such transfers would not result in the net assets of the Endowment Fund, as valued on a cost basis, being less than the initial endowment.

The net assets of the Endowment Fund at March 31, 1986, as valued on a cost basis, amounted to approximately $443,000,000 and on a market value basis, to approximately $515,000,000.

NOTE 4

Accounts Receivable

Accounts receivable consist of the following:

	1986	1985
Unexpended grants held by universities:		
Travel	$101,224	$ 54,277
Visiting lecturer	34,914	41,496
Miscellaneous	17,000	17,316
	$153,138	**$113,089**

NOTE 5

Commitments

As at March 31, 1986 the Foundation had committed the following amounts for scientific affairs expenditure:

Building program grants	$48,285,500
Scholarship and establishment grants	11,793,304
Heritage medical scientist grants	3,618,205
Fellowship grants and research allowances	3,388,700
Studentship grants and research allowances	1,926,134
Institutional grants	1,849,006
Major equipment and maintenance grants	1,120,946
Clinical fellowships and investigatorships	1,107,908
Independent establishment grants	521,759
Technology transfer grants	320,000
Special initiative grants and research allowances	269,998
Conference support grants	80,000
Visiting scientist grants	43,910
Clinical trainee grants	11,250
	$74,336,620

These commitments pertain to the following fiscal years:

1986-87	$34,980,323
1987-88	26,793,953
1988-89	10,552,107
1989-90	1,533,567
1990-91	455,189
1991-92	21,481
	$74,336,620

NOTE 6

Approval of Financial Statements

These financial statements were reviewed by the Audit Committee and recommended to the Trustees for their approval.

Schedule 1:
Schedule of Administration Expenses for the year ended March 31, 1986

	1986	1985
Salaries	$520,145	$484,656
Stationery, printing and office supplies	90,663	52,498
Depreciation and amortization	63,550	65,448
Public relations and advertising	62,936	62,916
Employee benefits	60,280	63,399
Consultant fees	58,841	14,421
Travelling and accommodation	52,950	35,968
Rental of premises	21,743	97,802
Postage and courier	21,417	12,054
Telephone	18,887	20,779
Maintenance	17,257	14,763
Vehicle	15,414	15,290
Insurance	8,306	2,817
Accounting and legal fees	5,041	3,025
Staff training	3,389	8,014
Recruitment	1,627	4,334
Purchased services	—	3,102
Miscellaneous	1,132	1,993
	$1,023,578	**$963,279**

HERITAGE MEDICAL SCIENTISTS

ALLEN, Peter, Ph.D., Department of Applied Sciences in Medicine, Faculty of Medicine, University of Alberta "Imaging and Biochemical Applications of NMR to Medicine"

DAVISON, Joseph, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Nervous Control of Gastrointestinal Secretions"

MALONEY, John, Ph.D., Departments of Obstetrics and Gynecology and Medical Physiology, Faculty of Medicine, University of Calgary "The Physiology and Development of the Fetus and Neonate"

McGHEE, James, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Gene Expression During Animal Development"

PATERSON, Malcolm, Ph.D., Departments of Medicine and Biochemistry, Faculty of Medicine, University of Alberta "Clinical Genetics and Molecular Carcinogenesis"

REMMERS, John, M.D., Departments of Medicine and Physiology, Faculty of Medicine, University of Calgary "Control of Breathing by the Nervous System"

SALMI, Aimo, M.D., Ph.D., Department of Medical Microbiology, Faculty of Medicine, University of Alberta "Immunopathogenesis of Neurovirological Diseases"

TER KEURS, Henk, M.D., Ph.D., Departments of Medicine and Medical Physiology, Faculty of Medicine, University of Calgary "Activation and Contraction of the Heart"

TYBERG, John, M.D., Ph.D., Departments of Medicine and Medical Physiology, Faculty of Medicine, University of Calgary "Cardiac Mechanics: Factors Affecting the Heart's Pumping Action"

WANG, Jerry, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Studies in Cell Regulation"

YOON, Ji-Won, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Two Possible Mechanisms for the Pathogenesis of Virus-Induced Diabetes Mellitus"

APPENDIX

HERITAGE MEDICAL SCHOLARS

ANDERSON, M. John, Ph.D., Department of Pharmacology and Therapeutics, Faculty of Medicine, University of Calgary "Development of the Neuromuscular Junction"

ANDERSON, Robert, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Control of Virus Synthesis and Assembly"

AUER, Roland, Ph.D., M.D., Department of Pathology, Faculty of Medicine, University of Calgary "Neuronal Death in Ischemia, Hypoglycemia, and Epilepsy"

BAZETT-JONES, David, Ph.D., Departments of Anatomy and Medical Biochemistry, Faculty of Medicine, University of Calgary "Ultrastructure of Transcription Complexes"

BEFUS, Dean, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Studies of Intestinal Immunity and Mast Cells"

BIDDLE, Fred, Ph.D., Departments of Pediatrics and Medical Biochemistry, Faculty of Medicine, University of Calgary "Genetic Studies of Threshold Traits of Mammalian Development"

BLASDEL, Gary, Ph.D., Department of Anatomy, Faculty of Medicine, University of Calgary "Development of Thalamocortical Afferents"

BOISVERT, Donald, Ph.D., M.D., Department of Surgery, Faculty of Medicine, University of Alberta "Pathophysiology and Therapy of Cerebrovascular Occlusion"

BOURNE, Gregory, Ph.D., Department of Physiology, Faculty of Medicine, University of Alberta "The Regulation of Testicular GnRH Receptors and GnRH-Like Peptides and their roles in Steroidogenesis"

BOWLING, Douglas, Ph.D., Departments of Medical Physiology and Anatomy, Faculty of Medicine, University of Calgary "Projections of Single Identified Retinal Axons"

BULLOCH, Andrew, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Cellular Basis of Adult Neuronal Plasticity"

CARNE, Thomas, Ph.D., Department of Chemistry, Faculty of Science, University of Calgary "Biosynthesis of Pituitary Hormones"

CLANDININ, Michael, Ph.D., Department of Food and Nutrition, Faculties of Home Economics and Medicine, University of Alberta "Nutrition and Metabolism of Dietary Fat"

CODDING, Penelope, Ph.D., Departments of Chemistry and Pharmacology and Therapeutics, Faculties of Science and Medicine, University of Calgary "Molecular Structure and Function Studies of CNS Active Drugs and Toxins"

DANIELSON, Terry, Ph.D., Department of Pharmacy and Pharmaceutical Sciences, Faculty of Pharmacy, University of Alberta "Metabolism and Plasma Levels of Clinical Monoamine Oxidase Inhibitors"

DASGUPTA, Mrinal, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "MBP-Specific CIC in Multiple Sclerosis"

DELAY, Michael, Ph.D., Assistant Professor, Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Excitation-Contraction Coupling in Muscle"

DUFF, Henry, M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Mechanistic Approach to Antiarrhythmic Therapy"

EGGERMONT, Jos, D.Sc., Department of Psychology, Faculty of Social Sciences, University of Calgary "Functional Plasticity of the Auditory Nervous System"

FAMIGLIETTI, Edward, M.D., Ph.D., Associate Professor, Department of Anatomy, Faculty of Medicine, University of Calgary "Functional Architecture of Vertebrate Retina"

FIELD, Leigh, Ph.D., Assistant Professor, Department of Pediatrics, Faculty of Medicine, University of Calgary "The Genetics of Susceptibility to Insulin-Dependent Diabetes"

FORD, Gordon, M.D., Department of Internal Medicine, Faculty of Medicine, University of Calgary "Interdependence of the Lung, Ribcage and Diaphragm During Atelectasis"

FRANK, Cyril, M.D., Department of Surgery, Faculty of Medicine, University of Calgary "Connective Tissue Structure and Function"

FRITZLER, Marvin, Ph.D., M.D., Division of Rheumatology and Clinical Immunology, Faculty of Medicine, University of Calgary "Antinuclear Antibodies in Autoimmune Diseases"

GILES, Wayne, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Electrophysiology of Isolated Cardiac Cells"

GREEN, Douglas, Ph.D., Department of Immunology, Faculty of Medicine, University of Alberta "Immunoregulatory T Cells and Molecules"

GREEN, Francis, M.D., Ph.D., Associate Professor, Department of Pathology, Faculty of Medicine, University of Calgary "Mechanisms of Lung Injury by Environmental Agents"

GREENSHAW, Andrew, Ph.D., Assistant Professor, Department of Psychiatry, Faculty of Medicine, University of Alberta, "Beta-Phenylethylamine, p-Tyramine and p-Octopamine and the Treatment of Affective Disorders"

HANGARTNER, Thomas, Ph.D., Department of Applied Sciences in Medicine, Faculty of Medicine, University of Alberta "Development of Methods to Diagnose and Treat Bone Disorders"

HANLEY, David A., M.D., Department of Internal Medicine, Faculty of Medicine, University of Calgary "Studies of Parathyroid Hormone Physiology"

HART, David, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Immunochemical Characterization of Plasminogen Activators"

HICKS, T. Philip, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Identification of Synaptic Transmitters in the Mammalian Visual and Somatosensory Systems"

HINDSGAUL, Ole, Ph.D., Department of Chemistry, Faculty of Science, University of Alberta "Biological Recognition of Complex Carbohydrates"

HOAR, David, Ph.D., Departments of Medical Biochemistry and Pediatrics, Faculty of Medicine, University of Calgary "DNA Sequence Diversity in Man"

HOFFER, J. Andy, Ph.D., Departments of Medical Physiology and Clinical Neurosciences, Faculty of Medicine, University of Calgary "Neural Control of Movements"

HULBERT, William, Ph.D., Department of Medicine, Faculty of Medicine, University of Alberta "The Effect of H_2S on Airway Structure and Function"

IATROU, Kostas, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "The Organization, Expression and Evolution of Eukaryotic Multigene Families in Chorion of Bombyx Mori"

JARVIS, Simon, Ph.D., Department of Physiology, Faculty of Medicine, University of Alberta "Molecular Properties and Regulation of the Nucleoside Transport System"

JAWORSKI, Martine, M.D., Department of Pediatrics, Faculty of Medicine, University of Alberta "Pathogenesis of Insulin Dependent Diabetes Mellitus"

JENSEN, Susan, Ph.D., Department of Microbiology, Faculty of Science, University of Alberta "Biosynthesis of Novel Penicillin and Cephalosporin Antibiotics"

KAUFMAN, Susan, Ph.D., Department of Medicine, Faculty of Medicine, University of Alberta "Control Mechanisms of Fluid and Electrolyte Balance"

KING, Malcolm, Ph.D., Associate Professor, Department of Medicine, Faculty of Medicine, University of Alberta "Studies on Mucus Clearance"

KOOPMANS, Henry, Ph.D., Department of Medical Physiology GI Research Group, Faculty of Medicine, University of Calgary "The Internal Control of Food Intake"

LAU, David, M.D., Ph.D., Department of Medicine, Faculty of Medicine, University of Calgary "Regulation of Adipose Tissue Development and Growth"

LEE, Patrick, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "The Mechanism of Virus Attachment of Host Cells"

LEFEBVRE, Yvonne, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Passage of Steroid and Thyroid Hormones Across the Nuclear Envelope of Mammalian Cells"

LEUNG, Wai-Choi, Ph.D., Departments of Medicine and Infectious Diseases, Faculty of Medicine, University of Alberta "Molecular Cloning of Viral Neutralization Antigen and Human Tumor Antigen"

LORD, Catherine, Ph.D., Department of Pediatrics, Faculty of Medicine, University of Alberta "Sex Differences in Autism"

MacVICAR, Brian, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Neuronal Basis for Synchrony During Seizure"

MANNONI, Patrice, M.D., Department of Pathology, Faculty of Medicine, University of Alberta "Antigen Characteristics of Hematopoietic Stem Cells"

MANTLE, Michele, Ph.D., Departments of Medical Biochemistry and Pediatrics, Faculty of Medicine, University of Calgary "Structure, Synthesis and Secretion of Intestinal Mucus"

MARANDA, Bruno, Ph.D., Department of Surgery, Faculty of Medicine, University of Alberta "Immuno-Cytochemical Investigation of Axonal Transport"

MARTIN, Renée, Ph.D., Department of Pediatrics, Faculty of Medicine, University of Calgary "Cytogenetic Analysis of Human Sperm"

MATHESON, David, M.D., Departments of Pediatrics and Internal Medicine, Faculty of Medicine, University of Calgary "Cellular Regulation of Immune Responses"

McFADDEN, Grant, Ph.D., Department of Biochemistry, Faculty of Medicine, University of Alberta "Molecular Biology of Tumorogenic Shope Fibroma Poxviruses"

McGARRY, Ronald, Ph.D., Departments of Pediatrics and Pathology, Faculty of Medicine, University of Calgary "Functional Role of MAG"

MILLER, Rodman, Ph.D., Department of Anatomy, Faculty of Medicine, University of Calgary "Freeze Fracture Localization of Antigens and of Cholesterol"

MILOS, Nadine, Ph.D., Department of Anatomy, Faculty of Medicine, University of Alberta "Factors Controlling Pattern Formation by Neural Crest Cells"

MINUK, Gerald, M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Role of GABA in Liver Disease"

MOORE, Graham, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "The Synthesis and Evaluation of Peptide Hormones and Analogues"

MORTIMER, David, Ph.D., Department of Obstetrics and Gynecology, Faculty of Medicine, University of Calgary "Human Sperm Physiology and Infertility"

NORTHUP, John, Ph.D., Department of Pharmacology and Therapeutics, Faculty of Medicine, University of Calgary "GTP Binding Proteins and Adenylate Cyclase"

PALCIC, Monica, Ph.D., Department of Food Science, Faculty of Agriculture/Forestry, University of Alberta "Enzyme Inhibitors as Therapeutic Agents"

PARHAD, Irma, M.D., Departments of Pathology and Clinical Neurosciences, Faculty of Medicine, University of Calgary "Neurofibrillary Degeneration: Pathogenic Mechanisms"

PARSONS, Howard, M.D., Department of Pediatrics, Faculty of Medicine, University of Calgary "Energy Expenditure and Fatty Acid Metabolism"

PITTMAN, Quentin, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Peptide Neurotransmission in Brain"

PREIKSAITIS, Jutta, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Transfusion Acquired Cytomegalovirus Infection: Epidemiology and Immune Response in Man"

QUANDT, Fred, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Electrical Properties of Isolated Retinal Neurons"

RAMCHARAN, Savitri, M.D., Ph.D., Department of Community Health Sciences, Faculty of Medicine, University of Calgary "Epidemiologic Studies of the Menstrual Cycle and PMS"

RATTNER, Jerome, Ph.D., Departments of Medical Biochemistry and Anatomy, Faculty of Medicine, University of Calgary "High Order Structure of Chromosomes"

REH, Thomas, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Regeneration of Optic Nerve"

REHA-KRANTZ, Linda, Ph.D., Department of Genetics, Faculty of Science, University of Alberta "The Biochemical Basis of Mutation"

REITHMEIER, Reinhart, Ph.D., Department of Biochemistry, Faculty of Medicine, University of Alberta "Structure and Function of Membrane Proteins"

REYNOLDS, John, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Studies of the Intestinal Immune System"

RORSTAD, Otto, M.D., Ph.D., Department of Medicine, Faculty of Medicine, University of Calgary "Mechanisms of Action of Brain Peptides"

SCHNEIDER, Wolfgang, Ph.D., Department of Biochemistry, Faculty of Medicine, University of Alberta "Receptor-Mediated Endocytosis in Oocytes"

SCHÜRCH, Samuel, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Lung Stability and Cell Adhesion"

SEVERSON, David, Ph.D., Department of Pharmacology and Therapeutics, Faculty of Medicine, University of Calgary "Lipid Metabolism in Heart and Blood Vessels"

SINGH, Bhagirath, Ph.D., Department of Immunology, Faculty of Medicine, University of Alberta "Mechanism and Regulation of Antigen Recognition by T-Lymphocytes"

SMITH, Peter, Ph.D., Department of Pharmacology, Faculty of Medicine, University of Alberta "Electrophysiological Studies of the Electrogenic Sodium Pump in Sympathetic Ganglia and Spinal Cord"

SNYDER, Floyd, Ph.D., Departments of Medical Biochemistry and Pediatrics, Faculty of Medicine, University of Calgary "Studies of Inherited Disorders of Nucleotide Metabolism"

SOKOL, Pamela, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Role of Iron in the Pathology of Pseudomonas Infection"

STOCKBRIDGE, Norman, M.D., Ph.D., Department of Surgery, Faculty of Medicine, University of Alberta "Signal Processing by Neurons"

TAYLOR, Diane, Ph.D., Department of Medical Microbiology, Faculty of Medicine, University of Alberta "Characterization of Bacterial Plasmids"

TYLER, Jonathan, Ph.D., Department of Genetics, Faculty of Science, University of Alberta "Structure and Function of Biological Membranes"

VOGEL, Hans, Ph.D., Department of Chemistry, Faculties of Medicine and Science, University of Calgary "NMR Studies of Mechanistic and Regulatory Aspects of Metabolism"

WAISMAN, David, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Studies of Calcium Binding Proteins"

WALSH, Michael, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Enzyme Regulation by Calcium"

WENMAN, Wanda, M.D., Department of Pediatrics, Faculty of Medicine, University of Alberta "Human Infections with Chlamydia Trachomatis"

WITKOWSKI, Francis, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Autonomic Neural Influences in Arrhythmogenesis"

WOODS, Donald, Ph.D., Department of Microbiology & Infectious Diseases, Faculty of Medicine, University of Calgary "Pathogenesis of Pseudomonas Aeruginosa Disease"

WYSE, George, Ph.D., M.D., Departments of Medicine and Pharmacology, Faculty of Medicine, University of Calgary "Investigations in Hypertension and Electrophysiology"

HERITAGE CLINICAL INVESTIGATORS

BEAUCHENE, James, M.D., Department of Surgery, Faculty of Medicine, University of Alberta "Biological Basis of Therapeutic Tissue Expansion"

GILL, Michael, M.D., Department of Medical Microbiology, Faculty of Medicine, University of Calgary "Investigations of Viral Pathogenesis"

MACLEAN, Grant, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Monoclonal Antibodies in Small Cell Lung Cancer"

RYAN, Edmond, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Insulin Resistance in Pregnancy"

SCOTT, Brent, M.D., Department of Pediatrics, Faculty of Medicine, University of Calgary "Gastrointestinal Motor Function"

WARNOCK, Garth, M.D., Department of Surgery, Faculty of Medicine, University of Alberta "Transplantation of Human Islets of Langerhans"

A booklet with summaries of the scientists' research is available from the Foundation upon request.

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